

The Palomar Testbed Interferometer: Status and Development

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Project Objective

The Palomar Testbed Interferometer was constructed by JPL as a hardware, software and operations testbed for the Keck Interferometer and other interferometry missions. The Michelson Science Center currently runs PTI for science operations and proposals are accepted from the JPL community.

PTI Highlights

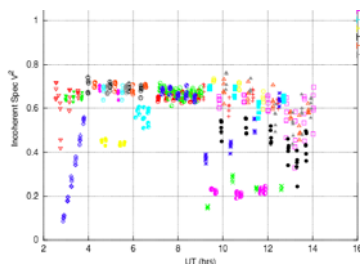
PTI observations cover a wide range of astrophysical topics including: stellar masses and luminosities of main sequence, evolved stars and multiple systems, Cepheid pulsations, dust disks around young stars and novae.

PTI was the first interferometer to demonstrate on-sky dual star astrometry across a 30 arcsecond field and it achieved a precision of 100 μ arcseconds.



Visibility amplitude

Current sensitivity limits are $V < 11$ and $K < 6$



Each point represents 25 seconds of fringe tracked data. Calibrators are interspersed with target sources.

Instrument Description

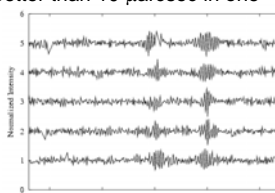
PTI is a Michelson interferometer operating in the near-infrared

- Pair-wise combination with 3 baselines from 85 to 110 meters
- Fringe tracking at H (1.6 μ m) and K (2.2 μ m) bands
- Highly automated operations and efficient science observing

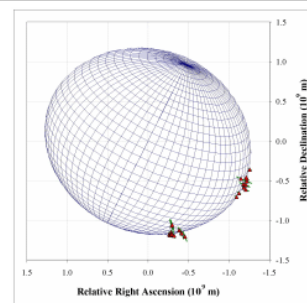
Very-narrow angle astrometry

Measure the separation of binary star fringe packets to get very accurate relative astrometry

- Works on binaries with < 1 arcsec separations
- Current performance is better than 10 μ arcsec in one hour
- Kulkarni et al. are conducting a survey for Jupiter mass planets in these systems
- See Lane and Muterspaugh (ApJ, 2004) for more details



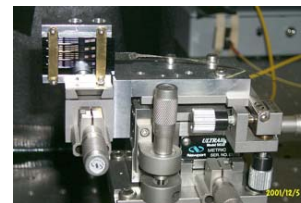
Binary star fringe data from PTI



Measurement of the oblateness of Altair

IONIC fiber combiner

Installation of the IONIC fiber combiner, formerly used at the IOTA interferometer is ongoing and will allow higher precision visibility observations.



IONIC beam combiner

Benefits to NASA and JPL

- The design of many subsystems at the Keck Interferometer benefited from PTI experience, including delay lines, infrared fringe tracker, real-time architecture, data visualization and pipelines, and the operations model.
- PTI gives JPL access to and experience with an operational facility covering all aspects of interferometry from observation planning and instrumentation to operations and data pipelines. Over 100 JPL personnel have attended a hands-on interferometry class based at PTI.

Publications

For more information on PTI, including a list of the over 50 refereed science publications, see <http://msc.caltech.edu/missions/Palomar/>

Access to PTI observations is open to the entire JPL community in a yearly call for proposals, please contact Rachel Akeson (rla@ipac.caltech.edu) for more information.